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IN THIS ISSUE:

UP Front FYI:

New England Small Fruit Pest Management Guide available: the 2010-2011 edition of the New England Small Fruit Pest Management Guide is available for $16 ($12 plus $4 s&h) and can be ordered through the UMass Fruit Team Website at http://www.umass.edu/fruitadvisor/fruitsubscriptions.htm

Time to renew: Once again we've come to subscription renewal time for Massachusetts Berry Notes. Subscription costs remain at $10 per year thanks to the generous underwriting by Nourse Farms. Your subscription fee helps support the production of the newsletter as well as other educational activities. Stay in touch with what is happening and renew your subscription today!

Go to www.umass.edu/fruitadvisor/fruitsubscriptions.htm.

High Tunnel and Season Extension Webinars: Recorded Versions Now Online: the Great Lakes Vegetable Working Group produced a series of webinars on high tunnels and season extension for vegetable crops. If you were unable to participate interactively in the live webinars, you can view the recordings of the webinars online. Visit http://glvwg.ag.ohio-state.edu/projects.php#seasonextension for links to the recordings and to the handouts. You can see the agenda for each session. This is also handy for those who participated and want to review some of the content.

Strawberry Variety Review

Courtney Weber, Cornell University

The winter months are a good time to review your current small fruit cultivars and to make plans for new plantings. New cultivars are released all the time, and the vast majority of them fail to catch on for various reasons including poor adaptability to diverse growing regions, unforeseen disease or insect susceptibility, or fruit characteristics that are unacceptable to the buying public.

The following sections are meant as a guideline for New York and the northeastern U.S. No cultivar will work well in all locations, soil types, and productions systems, but many have proven to useful in many different situations. In addition, many new cultivars show promise and may be suitable for your operation. However, as always, try new cultivars on a limited basis before abandoning cultivars that have proven reliable in your production scheme.

This list is by no means complete but should address most situations. For convenience, an asterisk follows the standard cultivars (*). The author can be contacted with questions or to discuss other possibilities at caw34@cornell.edu.

Strawberry Cultivars

Strawberries are probably the most variable and temperamental of the small fruits and also probably have the most cultivars to choose from because they are often adapted to a relatively small growing region. June-bearing types are most commonly grown in NY and the NE U.S., but interest is growing in day-neutral types grown on plastic.

Early Season

Sable (Nova Scotia, Patent Pending) is slightly earlier than Earliglow and is equal or better in flavor. Unfortunately it lacks size and firmness. This cultivar is only suitable for direct retail and u-pick operations. Frost damage can be a problem because the flowers open very early.

Earliglow* (USDA) is still considered the best tasting berry around. Primary berries are large and attractive and are suitable for retail or wholesale. Berry size drops off quickly after the primary berries and yields are relatively low.

Northeaster (USDA) was billed as a replacement for Earliglow and out performs it in all ways except flavor. Yield is higher and fruit size and attractiveness are equal to Earliglow but the flavor is unusual. The grape Kool-Aid like aftertaste can be a turn off to many customers.

Honeoye* (Cornell University-NYSAES) has reigned as the yield king for many years and produces an abundance of large, attractive, firm, berries that are suitable for all markets. Closer to an early mid season, the look of this berry sells it, but taste is the major drawback as it can be tart and can develop disagreeable aftertastes when over ripe or in heavy soils. It is susceptible to red stele disease but is manageable.

Mid Season

Brunswick (Nova Scotia, Patent Pending) has fruit size and yield similar to Honeoye. However, it has a squat, round shape and tend to be dark and bruise easily. The flavor is good but can be tart when under ripe.

Cavendish (Nova Scotia, Plant Patent #11,110) is a high yielding, high quality berry in a good year. However, high temperatures during ripening can cause uneven ripening that can be a real problem.

Darselect (France, Plant Patent #10,402) is a large fruited, high yielding cultivar. The berries are an attractive bright red with a long conical shape. The flavor is very good. However, it tends to be soft. It is worth a look.

Kent* (Nova Scotia) produces medium sized berries with very good yield, especially in new plantings. Hot weather can cause skin toughness to deteriorate. It is very susceptible to leaf spot and scorch and to angular leaf spot. It is very sensitive to Sinbar herbicide. It does not do well in hot weather.

L'Amour (NY1829, Patent Pending) is a new cultivar from Cornell for 2004. It is an early mid-season type with excellent fruit quality. Berries are bright red and firm but not hard, with excellent eating quality and flavor. Fruit is long round-conical with a fancy calyx, which makes them very attractive. Disease and insect resistance is unknown at this stage but no significant problems have been noted to date. I like this one a lot.

Mesabi* (University of Minnesota, Plant Patent #11,116) is a very high yielding berry with large berries and good flavor, but does not store well. It is resistant to red stele and tolerant to leaf diseases and powdery mildew.

Late Season

Allstar* (USDA) is good yielding, high quality cultivar with good flavor. Unfortunately, the color is pale red to orange and is unacceptable to an uninformed consumer.

Cabot (Nova Scotia, Patent Pending) produces impressive berries. Average fruit size is far larger than any cultivar currently available. Primary berries often weigh 40-50 g. The color can be pale and primary berries are often irregular in shape. Secondary berries do not have this problem. Yields

are very good. It is resistant to red stele. It is susceptible to virus infection.

Clancy (NYUS304B, Patent Pending) is a new release from Cornell that was developed through a joint venture with the USDA breeding program in Beltsville, MD. It has parents that are resistant to red stele root rot. The fruit is a round conical shaped with darker red color and good flavor. The flesh is firm with good texture and eating quality. Insect and other disease resistance is unknown at this time but no significant problems have been noted to date. Growers looking for a firm late season berry may want to try this one.

Jewel* (Cornell University-NYSAES, Plant Patent # 5897) continues to be the favorite in this season. The high quality berries are large and attractive with good flavor. Yields are moderate. On a good site, it's hard to beat. It is susceptible to red stele and can have vigor problems in poor sites.

Ovation (USDA) is extremely late. It doesn't flower after most others are past their peak. Fruit quality is average but there is little to compare it to in its season. Yields are moderate.

Seneca (Cornell University-NYSAES, Plant Patent #8991) is probably the firmest cultivar available for the northeast. The fruit is large, bright red and attractive but the flavor is only acceptable. It doe not runner heavily and can be adapted to plasticulture.

Winona (University of Minnesota, Plant Patent #10,191) has very large berries and average yields but can not compete with Jewel for fruit appearance. It has good vigor though and might be useful where Jewel does poorly.

Day Neutral

Everest is a fairly new cultivar out of the U.K. It has large, firm, bright red berries. It does not runner well and is only suited for plasticulture. Over wintering can be a problem with this one.

Seascape (UC-Davis, Plant Patent #7614) is a day neutral out of California that is seeing some success in the east. The fruit is large and very attractive. It is firm and good quality. It does not runner and is only suited for plasticulture. Over wintering can be a problem with this one.

Tribute and **Tristar** (USDA) have been the standard day neutral cultivars for the northeast for the last 20 years. They are disease resistant, vigorous, and runner enough for matted row production. Both are relatively small fruited and low yielding but off-season fruit may pay off. Of the two, Tribute has better size and Tristar has better flavor.

New Cultivars

These have not been tested in Geneva but may be of interest.

Evangeline (Patent Pending) this new cultivar from Nova Scotia ripens in the early season. The fruit is long conical in shape with a pronounced neck. The interior is white and it is susceptible to red stele. The fruiting laterals are stiff and upright which keeps the fruit off the ground and clean.

Sapphire is a late mid season cultivar from the U. of Guelph in Ontario. The fruit are bright red and large. It is reported to be tolerant of the herbicide Sinbar (terbacil).

Serenity is a late season cultivar that is also from the U. of Guelph in Ontario. It is tolerant to Sinbar (terbacil). The fruit is large and bright red. The skin tends to be soft. It reported to be moderately resistant to scorch and mildew.

Saint Pierre is a new cultivar out of Quebec. It has large conic shaped fruit that are pale red to orange, much like Allstar. Fruit firmness and flavor are reported to be very good.

Elsanta (Netherlands) is one of the most widely planted cultivars in Europe. It is June-bearing with high yield potential. Fruit is firm and aromatic. It is susceptible to red stele, anthracnose, and verticillium wilt.

Bish (Patent Pending) is a new cultivar out of North Carolina State University. This cultivar is large and firm. It is resistant to anthracnose. It is a June-bearing cultivar developed for use in plasticulture systems.

Avalon (Rutgers University, Plant Patent #11,372) is an early season berry with large fruit size. The fruit is rounder than Earliglow and somewhat dark. Flavor and firmness are very good. Plants are large and vigorous.

(***Source**: Cornell Fruit Program Page www.fruit.cornell.edu/Berries*).

BRAMBLES

Raspberry and Blackberry Varieties for Maine

David Handley, Univ. of Maine

Getting Planting Stock

Always start with high-quality planting stock. Poor plant material guarantees a poor planting. Order your plants from a reputable source, and look for nurseries that sell plants from certified virus-free stock. Then you can be sure that the plants have been tested and found free of common viruses. Virus-free plants have the best growth and productivity, and will live longer.

Order your plants in the fall and early winter for spring planting to avoid running into limited supplies. (Fall planting is not recommended in Maine.) Ask for a shipping date based on the date you plan to plant.

If you order raspberry plants from other countries, such as Canada, import permits are required. The plants may also have to undergo a post-entry quarantine. For more details on importing raspberry plants, contact the Maine Department of Agriculture, Food and Rural Resources at 28 State House Station, Augusta, Maine 04333-0028, or by phone at (207) 287-7602.

For details on growing methods, please consult University of Maine Cooperative Extension bulletin #2066, *Growing Raspberries and Blackberries*.

Types of Brambles

The type of brambles and varieties you choose to plant depends upon your site and your markets. Red raspberries are the hardiest type of bramble, but not all varieties can withstand extreme cold temperatures. Be sure to select only varieties described as "very hardy."

Nearly all summer-bearing varieties of red raspberries will suffer bud damage when temperatures drop below -20°F. Everbearing types are often mowed to the ground every spring, so sensitivity to cold temperatures is less important. However, in northern Maine, the growing season may not be long enough to ripen their fall crop. The variety 'Heritage,' for example, may bear the fall primocane (or first-year cane) crop too late to avoid frost injury in northern sites. These areas must be planted with earlier ripening varieties such as 'Polana' or 'Autumn Bliss.'

The variety you choose will affect the length of your harvest season. If you select an early ripening variety, a mid-season, a late-season, and a primocane-fruiting type, you can harvest berries from the end of strawberry season to the first hard autumn frost. If you're more interested in a concentrated season, plant varieties that have similar ripening periods.

Purple and black raspberries do not withstand cold temperatures as well as some red raspberry varieties. Most will winter-kill to the snowline if temperatures drop to -15°F. This is why there are few commercial plantings in Maine. These types of berries are also more prone to certain viral and fungal infections and need extra care.

It's important to test varieties on new sites. Despite glowing reviews from a nursery, a variety may not do well because of the particular qualities of your site (for instance, poor drainage, a short season, or low temperatures), or may not meet your customer demand. Try new varieties in small test plots before planting them on a large scale.

Types of Planting and Growing Stock

Nurseries use several methods of propagation for bramble plants. You can choose one of the following types of plant material.

Dormant suckers or "handles" are canes with one season of growth. They are dug after becoming dormant in the fall and stored until shipping. This is a common transplant type for red raspberries.

Tip-layered canes are the most common type of purple and black raspberry transplants. The growing tips of the plants are covered with soil in summer, causing them to root. These are separated from the cane after dormancy and stored until shipping.

Tissue-cultured plants start in a test tube. Growing tips of plants are cut from a virus-indexed source under sterile laboratory conditions, and placed in growth chambers. This small cluster of cells gets several treatments, which cause it to form small plantlets. These plantlets are placed in sterile rooting media and grown out in greenhouses. The small plants are sold in transplant trays, and you can buy them either growing or dormant, depending upon the supplier and grower. This method, although more costly, results in more uniform and disease-free plants than other propagation methods.

Choosing Varieties

Select varieties based on their intended use (such as pick-your-own, freezing, or fresh market), hardiness, productivity, disease susceptibility, fruit quality, and time of ripening. The best varieties for home gardens include 'Boyne,' 'Killarney,' 'Reveille', and 'Nova' for red raspberries; 'Polana' and 'Autumn Bliss' for everbearing varieties; 'Royalty' for purple varieties; 'Jewel' for black raspberries; and 'Illini' for blackberries.

Red raspberries, summer-bearing

Algonquin: From British Columbia. Ripens mid to late season. Only moderately hardy, spineless, with upright, compact growth. Good quality fruit. Resistant to mosaic virus.

Boyne: From Manitoba. Ripens early and has excellent winter hardiness. Plants are spiny and produce many suckers. Fruit is small to medium in size, somewhat dark and soft, but with fair flavor and good freezing quality. Susceptible to anthracnose. Typically yields very well. Highly recommended for colder sites.

Canby: From Oregon. Ripens mid season, only moderate hardiness. Plants are tall, nearly thornless, and moderately productive. Fruit is medium to large, firm, bright red, with excellent flavor. Buds may winter-kill in cold climates.

Encore: From New York. Ripens late. Hardy, vigorous plants. Large fruit with good quality.

Festival: From Ontario. Ripens mid season, hardy, very productive. Short plants with few spines. Fruit are medium-sized, bright red, firm, with good flavor. Very

susceptible to rust, but less susceptible to mosaic virus and spur blight.

Killarney: From Manitoba. Sibling of 'Boyne.' Early ripening, slightly behind 'Boyne.' Plants are very hardy, spiny, produce many suckers, and are susceptible to mildew. Plants are short to medium. Fruit is medium-sized, but very bright red. Flavor and freezing quality are good, but berries may soften in warm weather. Susceptible to anthracnose. Highly recommended for colder sites.

Latham: From Minnesota. Mid-season ripening, very hardy. Plants are vigorous with few spines. Small fruit with good color, but crumbly with only fair flavor. Ripens over a long period of time. Less susceptible to viruses than some varieties. Recommended for colder sites.

Lauren: From Maryland. Only moderately hardy. Tall, vigorous plants with good quality, large fruit, high yielding. Recommended for trial only in southern Maine.

Newburgh: From New York. Mid-season ripening, hardy. Plants tall but not highly vigorous. Some spines. Partially resistant to common cane diseases and root rot. Fruits are medium in size, light red, with good flavor. May be crumbly, and tend to ripen unevenly.

Nova: From Nova Scotia. Very hardy plants with good vigor and few thorns. This variety appears to be resistant to most common cane diseases. Fruit ripens mid season, is medium-sized, firm, bright red, and somewhat acidic.

Prelude: From New York. Hardy, with moderate vigor. Early ripening. Fruit are medium-sized with fair to good quality. May produce a late fall crop on one-year canes (primocanes).

Regency: Mid-season ripening, hardy. Vigorous, moderately thorny canes. Good yields of medium-sized fruit.

Reveille: From Maryland. Early ripening, very hardy. Plants are vigorous, producing many suckers. High yielding. Fruits are medium to large with good flavor, but very soft. Poor shipping and freezing quality.

Taylor: From New York. Late ripening, moderately hardy. Plants are vigorous with some spines. Very susceptible to mosaic virus, leaf spot, and fungal diseases. Fruit is medium to large with excellent flavor, good color and firmness.

Titan: From New York. Mid- to late-season ripening, only moderate hardiness. Large canes with few spines, suckers emerge mostly from the crown (i.e. slow spreading). Susceptible to crown gall and *Phytophthora* root rot. Fruits are very large and dull red, with mild flavor. Difficult to pick unless fully ripe.

Red raspberries, everbearing (primocane-fruiting)

Amity: From Oregon. Fall (primocane) crop ripens early in mid season for everbearing types. Moderately vigorous canes with spreading habit, very few spines. Some resistance to cane diseases and root rots. Fruit are medium-sized, firm, with good color and mild flavor.

Autumn Bliss: From East Malling, England. Early-ripening primocane crop (late August, about two weeks earlier than 'Heritage'). Moderately vigorous canes with few spines. Productive. Fruit is large and highly flavorful.

Autumn Britten: From East Malling, England. Early-ripening primocane crop, slightly later than 'Autumn Bliss' and with more vigorous canes. Productive. Fruit is firm and flavorful.

Caroline: From Maryland. Mid- to late-ripening fall crop, may be too late for northern Maine. Tall, vigorous plants, with medium to large good-flavored fruit. Productive.

Fall Red: From New Hampshire. Early-ripening primocane crop. The medium to short canes are vigorous, and produce many suckers. Moderately spiny. Fruit size is medium. Good flavor, but soft. Recommended for most sites in Maine.

Heritage: From New York. Primocane crop ripens relatively late, too late for all but southern Maine. Tall, rugged canes with prominent thorns. Very high yielding. Fruit size is medium, with good color, flavor, and firmness. This variety is not recommended for regions with a short growing season (frost before September 30 or cool summer temperatures).

Jaclyn: From Maryland. Early-ripening fall crop. Vigorous canes produce long, dark red fruit, which may be difficult to pick. Flavor is good.

Joan J: From England. Early ripening (about the same as 'Autumn Bliss'). Vigorous, thornless canes produce large, somewhat dark red fruit with good firmness and quality.

Polana: Very early-ripening, vigorous, short, productive canes. Attractive small to medium-sized fruit, but many misshapen and difficult to pick. Flavor only fair. Recommended for northern areas with short growing seasons.

Redwing: From Minnesota. Primocane crop ripens earlier than 'Heritage' in some years and sites. Canes not vigorous, with moderate spines. Moderately productive with large fruit size. Flavor is fair to good, but fruits tend to be soft.

Yellow raspberries, everbearing (primocane-fruiting)

Anne: From Maryland. Fall crop ripens slightly before 'Heritage,' and may be too late for northern regions. Canes are tall and moderately vigorous. Fruit are pale yellow, large, with very good flavor.

Fall Gold: From New Hampshire. Primocane crop ripens relatively early. Canes are hardy and very vigorous,

producing many suckers. Fruit is medium-sized, yellow with a pink blush, soft, but with excellent flavor.

Kiwigold: From New Zealand. Derived from 'Heritage.' Slightly earlier than 'Heritage;' may be too late for northern regions. Vigorous canes, thorny, fairly tall, and productive. Fruit are yellow with a dark orange to pink blush, and good flavor.

Purple raspberries, summer-bearing
In general, purple raspberries are not adequately hardy to be commercially viable in most of Maine.

Brandywine: From New York. Ripens later than most red varieties. Canes very tall with prominent thorns; suckers from crown only, will not fill in. Susceptible to crown gall, but partially resistant to many other diseases. Fruits are large, reddish purple, and quite tart. Best used in jams or jellies.

Royalty: From New York. Ripens late. Very productive canes are tall and vigorous, with thorns. Immune to the large raspberry aphid, which decreases the likelihood of virus infection, but plants are susceptible to *Phytophthora* root rot and crown gall. Fruit are large, reddish purple, irregular. Fruit tends to be soft, but flavorful when eaten fresh.

Black raspberries
Black raspberries may winter-kill to the snowline if temperatures drop to -10°F and winds are dry. They are also quite susceptible to virus infections, *Verticillium*, anthracnose, and rust. They are not considered commercially viable for Maine.

Bristol: From New York. Canes are vigorous but susceptible to disease. Medium to large fruit of good quality, with good yield.

Blackhawk: From Iowa. Vigorous plants, relatively hardy and productive. Fruit is medium-large, glossy, with good flavor.

Jewel: From New York. Mid-season ripening. Possibly the hardiest black raspberry variety. Plants are vigorous, erect, and productive. Appears to have somewhat more disease resistance than other varieties. Fruit is firm and glossy with good quality.

Mac Black: From Michigan. Late ripening. Vigorous, erect canes. Medium to large fruit, soft, with good flavor.

Blackberries, thornless
Thornless blackberries have vigorous canes that must be staked or trellised. They are not hardy below -10°F and are not commercially viable for Maine. They ripen later than most red raspberries.

Chester: Late-season ripening, possibly hardier that other varieties. Resistant to cane blight. Fruit is of high quality, although it tends to be tart.

Triple Crown: Early-mid-season ripening. Vigorous, semi-erect canes. Fruit are large with good flavor.

Blackberries, thorny (erect)
Erect blackberries have tall, rugged canes with prominent thorns. Although the fruit are somewhat sweeter than thornless blackberries, the plants give similar yields and are equally sensitive to low temperatures. They are not recommended for commercial production in Maine. Virus infections are common in blackberries and may cause poor winter survival, and sterility, resulting in no fruit.

Darrow: From New York. Hardy. Canes are vigorous with large thorns. Good yields with long harvest season. Fruit are large and glossy, excellent quality.

Illini: From Illinois. Hardy, very thorny blackberry with large, attractive fruit. Not as flavorful as 'Darrow,' but more productive.

Fort Kent King: Propagated from an established population in northern Maine. Considered very hardy. Canes are somewhat arching and thorny. Plants spread vigorously. Fruit are small to medium-sized with fair flavor. Not widely available.

Go to http://extension.umaine.edu/publications/2172e/ to view excellent short video clips on raspberry and blackberry varieties.

(***Source**: Univ. of Maine Small Fruit Publications*)

BLUEBERRY

Lingonberry

Cheryll Greenwood Kinsley , Washington State University Whatcom County Extension

The choice of this month's featured plant is *not* a reminder to get your flu shot—although that's always a good idea. But the Latin root of "vaccine" and *Vaccinium* is the same. It's *vacca*, which means cow. Thus a common English name for this particular species of Vaccinium is cowberry, known in Sweden as "lingon." So "lingonberry"—or "lingenberry," as it's sometimes spelled—is a bit redundant. Beyond this straightforward foray into nomenclature, however, all bets are off where *Vaccinium vitis-idaea* is concerned. In addition to cowberry, it's also known in various regions of the world as alpine cranberry, moss cranberry, rock cranberry, mountain cranberry, red whortleberry, foxberry, and partridgeberry. I can't find any references to "voleberry," squirrelberry," "reindeerberry," "mooseberry," "skunkberry," or "snowshoehareberry," although they eat

it, too, as do bears and many kinds of birds. Sheep don't touch it, apparently, if other things are available, but to get us back on track, cows do. So, thankfully, it's also known as "lingberry," "lingon," "lingen," and—we finally made it back!—lingonberry. This latter term originated right here in the United States, only about 50 years ago.

Picture courtesy of Oregon State University Landscape

As you may have guessed, *Vaccinium vitis-idaea* is native to high, cold places. It's found across northern Europe, through Siberia and on into Japan and northern China. There is a subspecies native to a great swath across the Americas, ranging from Greenland to British Columbia and the northern environs of the United States. Its name is *Vaccinium vitis-idaea minus* and it's much smaller than the species, in stature as well as in the size of its leaves. *Minus* is Latin for "itty bitty."

The lingonberry is related to the blueberry, and to the cranberry. *Vaccinium* is a very large genus, with more than 450 species—most of which have food value as well as ornamental appeal—native to all global regions. The Pilgrims recognized *V. macrocarpon*—the native American cranberry—when they saw it because of its similarity to the *V. oxycoccus* they knew from their European homes. The berries of *V. macrocarpon* were larger, but it had the same renowned keeping qualities. All cranberries are rich in benzoic acid, which is a natural preservative.

But we'll return now to *Vaccinium vitis-idaea*. Its cousins will have to wait for their own column. This evergreen shrublet of up to 16 inches in height when fully grown makes a fine ground cover or small edging plant, particularly in a heather garden. It spreads by rhizomes, although very slowly and could never be called invasive. The small, broad leaves are thick and almost leathery. Deep green in the summer with purple overtones in winter, they provide a nice backdrop for spikes of pinkish flowers that appear twice each year and give way to two annual crops of bright red berries about the size of peas. These are tart and flavorful and much prized for everything from pastries to jellies and wines. They are very high in vitamin C and provide the basis for arbutin, used to treat intestinal disorders. Their cholesterol-lowering properties are touted in Europe. The 'Koralle' variety widely available here as an ornamental is an important commercial crop in Germany and Scandinavia.

Vaccinium vitis-idaea is fully hardy here and relatively easy to grow, so long as you follow a few simple rules. Remember that all members of the *Vaccinium* genus are acid-loving plants. Give them a site with adequate drainage and full sun, and go easy on the fertilizer. They appreciate a sandy soil well amended with humus so if you have clay, work the soil well and amend it appropriately before planting your lingonberries. An annual feeding, in the spring with an acid fertilizer is sufficient. Any more than that, and the surrounding weeds will grow at the expense of the lingonberry. Keep the moisture level constant during the growing season.

No pruning is necessary. In fact, with minimal care, *Vaccinium vitis-idaea*, once established, will form an attractive mat that will effectively block weeds. Few diseases bother it, so long as it grows in a site that meets its requirements. That's the challenge, with lingonberries. It has few pests. You know that sheep won't be a problem, unless there's nothing else for them to eat. Watch out for the occasional cow, however, and be on the alert for foraging reindeer, particularly at this time of year. The tinkling of their sleigh bells will let you know they're in your neighborhood.

Happy holidays to all. May your pear trees flourish and your partridgeberries thrive, if that is your heart's desire. (***Source**: Whatcom County Plant of the Month December 2001*)

Biology and Management of Grape Phylloxera

Adapted from: Donn Johnson, Sandra Sleezer, Barbara Lewis, University of Arkansas

Grape phylloxera, *Daktulosphaira vitifoliae* is becoming a more important pest of grapes as growers in Arkansas and in other north central states in the United States plant more French-American hybrid cultivars.

***[Editors Note:** Please be aware that phenology and phylloxera growth stages described in this article are for Arkansas and will be approximately 6-8 weeks later in New England.]*

Figure 1. Root form of grape phylloxera on a grape root

Biology. Grape phylloxera is a key pest of grape throughout the world. This pest has two forms that either attack the root (radicicola) or the foliage (gallicola). In humid climates like the Ozarks, grape phylloxera over winter either as immature grape phylloxera feeding on roots or as eggs laid on the trunk in the fall.

During spring and summer, the root form produces several generations that feed on the roots (Fig. 1) causing root tips to swell into nodosities (Fig. 2 and 3).

In August, winged forms emerge from the soil and produce eggs. These eggs hatch and mature in September and early October into males or females that mate, and the female lays one egg that over winters on the trunk.

In early April, eggs on the trunk hatch into first-generation yellow crawlers. These crawlers move to grape shoots to feed on the first to third expanding terminal leaves of the season. These leaves form a gall around each crawler (Fig. 4, inside). The first generation crawlers usually form less than five galls per leaf (Fig. 4). During April and early May, each crawler matures into a fundatrix or stem mother (center of Fig. 5, inside). Each stem mother produces a second generation of 100 to 300 oblong, crawlers.

Damage. Most leaves of susceptible cultivars that expand after late May have more than 50 galls per leaf (Fig. 7) (see Susceptible Cultivars). Severe leaf galling prevents leaf expansion; causes leaf distortion and shortened shoots that reduce photosynthesis, poor canopy architecture, leaf necrosis, premature defoliation, delayed ripening, reduced crop quality; and predisposes vines to winter injury.

In eastern North America, foliar-infested grapes also have the root form causing nodosities on small roots but no tuberosities on larger roots. Bates et al. (2001) found that root grape phylloxera alone, lack of irrigation alone and combination of root grape phylloxera and water stress caused 21, 34 and 54 percent decreased 'Concord' vine dry mass, respectively.

In drier growing regions like California and Europe, the root form of grape phylloxera not only induces nodosities on small roots but causes tuberosities on larger, older portions of the root.

Tuberosities allow entry of secondary, soil-borne pathogens into the grape roots that leads to root necrosis and eventually to vine death of pure French V. vinifera cultivar vines.

Susceptible Cultivars. Growers should be aware that the following cultivars hybridized from French V. vinifera and American Vitis species get economically damaging leaf galling by grape phylloxera: Aurora, Cascade, Catawba, Cayuga White, Chambourcin, Chancellor, Chelois, DeChaunac, Delaware, Himrod, Lakemont, Norton/Cynthiana, Rayon D'Or, Reliance, Rougeon, Seibel, Seyval, Vidal, Vidal Blanc, Vignoles.

Degree-Day Model. On a grape phylloxera susceptible cultivar, record the date when vines begin to expand the first grape leaves in late March to early April (biofix).

Figure 2. Root form of grape phylloxera cause swollen grape root tips called nodosities (circled)
Figure 3. Root form of grape phylloxera (circled) feeding on grape root nodosities

After this biofix date, begin accumulating daily degree-days (DD) (base 43° F; reported by Belcari and Antonelli, 1989) by using the following equation for DD:

DD = average daily temperature – 43

Figure 4. Mature grape phylloxera stem mother galls (circled) on first to third expanded leaves at the base of shoot in May
Figure 5. Mature foliar grape phylloxera gall with many eggs and two crawlers (circles and inset) in May

Table 1. Grape rootstocks resistant to the root form of grape phylloxera

Rootstock Parentage	Rootstocks
V. riparia x *V. rupestris*	'3309', '101-14', 'Schwarzmann' (used in Ozarks)
V. rupestris	'Saint George'
V. riparia	'Gloire de Montpelier'
V. berlandieri x *V. riparia*	'161-49', 'SO4'. 'Teleki 8 B', '5BB', '5 C Teleki', 'Kober 125 AA', '420 A'
V. berlandieri x *V. rupestris*	'99 R', '110 R', '1103P', '140R'
V. riparia x *V. solonis*	'1616 C'
V. riparia x *V. cordifolia* x *V. rupestris*	'44-53 M'
V. riparia x *V. berlandieri* x *V. rupestris*	'Gravesac'

Source: Candolfi-Vasconcelos http://berrygrape.org/phylloxera-resistant-rootstocks-for-grapevines/

The second-generation crawler emergence period occurs from 554-800 DD accumulated after the biofix date (insecticide spray period) or from early to late May. Third-generation crawlers begin emerging from second-generation galls after 1,200 DD, which was June 12, 2009, in Altus, AR.

Figure 6. Mature stem mother gall (circle) on first to third mature leaf and immature, "rash-like" galls on the underside of expanding terminal leaf caused by crawler (inset) feeding on top side of leaf on June 15 (Hillsboro, MO)
Figure 7. Second and third generation grape phylloxera galled leaves on the same shoot and severely galled leaf (inset)

Scouting. Twice weekly from 450 to 700 DD after biofix, inspect for grape phylloxera crawlers on susceptible vines with a history of foliar galling. On several susceptible vines, look for mature stem mother galls on the three oldest leaves. Use a 10X magnification hand lens to check for crawlers on the upper leaf by the mature gall or inside a mature gall that has been cut open (Fig. 5, inset). You can delay insecticide sprays until you begin to see expanding terminal leaves with pin-sized galls that appear pitted. Inspect these leaves with a hand lens to see a yellow crawler inside each immature opened gall on the upper leaf surface (Fig. 6, inset).

Timing Sprays. Apply insecticide (Table 2) to foliage in May when you first see yellow crawlers in stem mother galls (Fig. 5) and see immature galls (rash-like) on the expanding terminal leaves (Fig. 6). An alternative to insecticide is to apply Surround kaolin clay (Table 3) to the foliage which may take a couple passes of sprayer to whitewash foliage with Surround. As long as crawlers are present (two to three weeks), maintain whitewashed appearance of foliage by reapplying Surround after rains or as new terminal leaves develop or keep foliage protected with insecticide (see Chemical Control).

Cultural Control: Greenhouse tests and small field-plot experiments demonstrated that compost in soils reduced root necrosis due to fungal pathogens (Granett et al., 2001, 2003). Also, organically managed vineyards had less fungal pathogen damage than conventionally managed vineyards (Granett et al., 2001). However, more research is needed to demonstrate any deleterious affect on root grape phylloxera.

In the Ozarks, the number of grape phylloxera feeding on roots (Fig. 1) and the number of root nodosities per vine (Fig. 2 and 3) vary by grape cultivar. For growers planting pure V. vinifera cultivars, it is recommended that scions be grafted to rootstock resistant to the root form of grape phylloxera (Table 1). Two rootstocks successfully used in the Ozarks are '3309' and '101-14'. The parentage of grape phylloxera resistant rootstocks derived from crosses of American Vitis species are listed in Table 1. Some of these rootstocks also resist nematodes and are adapted to a particular vineyard soil type or climatic condition.

Chemical Control: Spray as soon as possible if there are walking yellow crawlers inside the galls or if you see immature galls forming on expanding terminal leaves. At this point, crawlers are still exposed in immature, opened galls and can be killed by an insecticide application (see Timing Sprays). Several insecticide formulations are registered and reported as effective against foliar grape phylloxera in Ohio (McLeod and Williams, 1994; Williams and Fickle, 2005) and in Missouri (Johnson et al., 2008, 2009).

Table 2. Registered insecticides and a crop protectant registered against foliar grape phylloxera on grape

Common Name	Trade Name and Formulation	Rate Per Acre	Group Number; Chemical Name; Mode of Action (site of action)
Imidacloprid	Admire Pro Systemic Protectant	7 to 14 fl oz	4A; Neonicitinoid; Nicotinic acetylcholine receptor agonists
Acetamiprid	Assail 30 SG	2.5 oz	4A; Neonicitinoid; Nicotinic acetylcholine receptor agonists
Fenpropathrin	Danitol 2.4 EC	10 2/3 lb	3A; Pyrethroids; Sodium channel modulators
Spirotetramat	Movento	6 to 8 fl oz	23; Tetramic acid derivatives; Inhibitors of acetyl CoA carboxylase-lipid synthesis, growth regulation
Kaolin clay	Surround WP Crop Protectant	25 lb	Repellent particle barrier film

Registered formulations include Admire Pro, Assail, Danitol, Movento and Surround (Table 2). Danitol and Movento required one application against second generation crawlers, whereas Assail worked as well as Danitol when applied twice at a 15-day interval (Johnson et al., 2008). Admire Pro suppresses foliar grape phylloxera when applied into the root zone by early April by chemigation, side-dress or hill drench. In the past, Endosulfan, an organochlorine compound, was the standard formulation used against grape phylloxera, but it was phytotoxic to many cultivars sensitive to sulfur. **Endosulfan is no longer registered for use on grape against grape phylloxera**.

For registered insecticide formulations and rates per acre, see Table 2 or the current printed or online versions of MP144, *Insecticide Recommendations for Arkansas* or Arkansas Small Fruit Management Schedule or Midwest Commercial Small Fruit and Grape Spray Guide. (***Source**: Univ. of Arkansas Pest & Disease Fact Sheets - http://comp.uark.edu/~dtjohnso/Pest_and_Disease_Facts.html*)

GENERAL INFORMATION

USDA Announces Sign-up for Conservation Programs in Massachusetts

Steve Bogash, Penn State Cooperative Extension

AMHERST, Mass. (December 14, 2010) – The United States Department of Agriculture's Natural Resources Conservation Service has announced application cut-off dates for several conservation programs in Massachusetts. These federal programs, authorized under the 2008 Farm Bill, provide financial and technical assistance to help local farmers protect soil, water and other natural resources.

Applications for Farm Bill conservation programs may be submitted at any time, however applications received by the dates below will be considered for the next round of ranking and funding in Massachusetts. Farmers should visit their local USDA service center to apply; locations are listed on-line at http://offices.usda.gov or in the phone book under Federal Government, U.S. Department of Agriculture. General program information is available on the NRCS Massachusetts website at www.ma.nrcs.usda.gov.

Environmental Quality Incentives Program (EQIP) – EQIP helps farmers and forest landowners address water quality, water conservation, invasive species control, soil quality, erosion control, nutrient and pest management, prescribed grazing, irrigation efficiency, energy efficiency, forest stand improvement, and other natural resource concerns. **Cut-off date: January 14, 2011**.

EQIP Organic Initiative – the EQIP Organic Initiative is a nationwide special initiative to provide financial assistance to National Organic Program (NOP) certified organic producers as well as producers in the process of transitioning to organic production. Applicants will be competing only among other organic/transitioning farmers. The objective of this initiative is to make EQIP assistance more available, appropriate and accessible to organic food producers. **Cut-off date: March 4, 2010**.

Grassland Reserve Program (GRP) – GRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance grasslands on their property through easements and rental agreements. This year, farmland under a state Agricultural Preservation Restriction (APR) will be eligible for GRP rental agreements. **Cut-off date: February 18, 2010**.

Wetlands Reserve Program (WRP) – WRP offers an opportunity for landowners to voluntarily protect, restore and enhance wetlands on their property. WRP offers three options to landowners: permanent easements, 30-year easements or 10-year restoration cost-share agreements. **Sign-up is continuous so landowners may apply at any time**.

"The 2008 Farm Bill provides additional incentives for landowners who are beginning, have limited resources, or who are socially disadvantaged because they belong to racial or ethnic groups that have historically been subjected to prejudice," said Christine Clarke, NRCS State Conservationist for Massachusetts. "Such landowners can receive up to 90 percent of the costs associated with planning and implementing conservation measures and up to 30 percent of expected costs may be provided in advance."

NRCS has offices in Greenfield, Hadley, Holden, Hyannis, Pittsfield, Westford, and West Wareham, which work with local conservation districts and other partners to serve farmers and landowners throughout the commonwealth. (***Source**: NRCS Conservation Connection E-Blast. Dec. 15, 2010*)

UPCOMING MEETINGS:

December 17, 2010 - *Vineyard and Winery Economics and Management Seminar* at the Fletcher Free Library, 235 College Street, Burlington VT. RSVP to Mark Cannella by December 6th , (802) 655-4540 Ext 110 or mark@intervale.org

January 6-7, 2011. *NARBA (North American Raspberry and Blackberry Growers Association) Annual Meeting*, Savannah, GA. For information see http://www.raspberryblackberry.com/ or contact Debby Weschler at E-mail: info@raspberryblackberry.com.

January 7, 2011. *NEV&BGA and UMass Extension Winter Meeting and GAP Training*, Location TBA. To register and for more information contact John Howell at 413-665-3501, howell@umext.umass.edu, or Ruth Hazzard at 413-545-3696, umassvegetable@umext.umass.edu, or see www.umassvegetable.org.

January 8, 2011 - *NOFA VT Direct Marketing Conference*. South Royalton,VT. Pre-Registration required. Please contact NOFA-VT for more information or to pre-registrar 434-4122 or info@nofavt.org

January 20, 2011 – *Connecticut Vegetable & Small Fruit Grower's Conference*. Tolland County Agricultural Center, 24 Hyde Ave, Vernon CT. 8:00 – 3:30. For more information contact Lorraine Los at Lorraine.Los@uconn.edu

January 29, 2011. *Winter Vegetable & Berry Meetings***.** Waltham Field Station, Waltham, MA. The January 29 program will include a half day on soil and nutrient management, reduced tillage including deep zone tillage, and cover crops. Registration opens at 9:30 am and programs run from 10 am to 4 pm. To register and for more information contact John Howell at 413-665-3501,

howell@umext.umass.edu, or Ruth Hazzard at 413-545-3696, umassvegetable@umext.umass.edu, or see www.umassvegetable.org.

January 31 – February 3, 2011. *Mid-Atlantic Fruit and Vegetable Convention* at the Hershey Lodge in Hershey, PA. For more information visit www.mafvc.org.

February 8-11, 2011. *7th North American Strawberry Symposium and joint North American Strawberry Growers Association Meeting.* Tampa, Florida. Details available soon.

February 23-24, 2011 - *Ontario Fruit and Vegetable Convention*. Brock University, St. Catharines, Ontario For more details visit: http://www.ofvc.ca/

March 5, 2011. *Planting, Cultivating, and Marketing Juneberries in the Great Lakes Region*. NYS Agricultural Experiment Station, Geneva, NY. More information available soon.

June 22-26, 2011. *10th International Rubus and Ribes Symposium, Zlatibor, Serbia***.** For more information contact: Prof. Dr. Mihailo Nikolic, Faculty of Agriculture, University of Belgr, Belgrade, Serbia. Phone: (381)63 801 99 23. Or contact Brankica Tanovic, Pesticide & Environment Research Inst., Belgrade, Serbia. Phone: (381) 11-31-61-773.
